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Highlights of today's scientific research and its funding

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Abstract

On 18 December 2006, the Council adopted decisions establishing the Seventh Framework Programme of the European Community (EC) for research and technological development for the period 2007 to 2013, and the FP7 for nuclear research activities (Euratom) for 2007 to 2011. The Council also adopted a regulation laying down the rules for the participation of undertakings, research centres and universities in actions under FP7-EC and for the dissemination of research results. The programme places greater emphasis than in the past on research that is relevant to the needs of European industry, to help it compete internationally, and develop its role as a world leader in certain sectors. The programme will also for the first time provide support for the best in European investigator-driven research, with the creation of a European Research Council. Focus will be on excellence throughout the programme, a requirement if it is to play its role in developing Europe's global competitiveness. Another priority will be to make participation in the programme simpler and easier, through measures addressing the procedures, plus a rationalisation of instruments.

Key words: *knowledge based society; scientific research; dissemination of research results; excellence centres, global competitiveness.*

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At the fifth European Researchers Night, 200 cities across Europe celebrated on September 25th the science in various ways but in the same currency. Plays in Lisbon, sports competitions in Brussels, a collective mural painting in Milan. Meanwhile, in other European cities, all eyes were glued to the sky to explore the cosmos. In those evening, European citizens from 30 countries had the opportunity to meet with professional scientists, to take part to scientific experiments, to use sophisticated research equipment, to understand the links between science and art and to realize how far can reach the limits of knowledge. Anyone could be a scientist price of a night.

Researchers' night was initiated in 2005 by European Commission. The fifth edition has provided a unique opportunity to actually talk to the researchers and to approach each other with magic and beauty of science. The event represented an excellent opportunity to discover extraordinary projects of European research and learn more about how to build a scientific career.

I summarized this event that highlights the broad, strongly, once again, primary importance conferred on a European and global scientific research.

Europe needs research. If we want to remain competitive in a global market, if we want to face challenges of changing the climate and aging, than it is impetuous to know more and better. We don't have natural resources (I mean non-renewable nature of them), we are concerned about environment and we cherish (as citizens of The Old World) our social systems. Therefore, to feed our expectations to be one step ahead of others, the most effective leverage is the power of our brains.

In December 2006 the European Commission launched the seventh Framework Program for research and technological development for the period 2007-2013. If we would realize what I think we can, than, by the end of this program, we Europeans, we lead the world in a series of new technologies, such as low-emission buildings. The pharmaceutical industry will produce new treatments against diseases and pandemics that watch us such as cancer or flu. We will help developing counties by putting them available technologies for water purification performance and finding new solutions to fight against diseases such as AIDS and malaria. We will reduce the effects of pollution caused by coal and other fossil fuels with carbon capture and storage and we will export these top technologies in the rest of the world. And perhaps this program (of course it's extensions) and the European Research Council will help us win some Nobel prizes for during this step!

European research highlights

Scientific research, technological development and innovation are the three pillars of a knowledge-based economy, are at the same time key-factors of economic growth and competitiveness effectors of full employment of labor. This is why the European Commission put strong development of scientific research among its major objectives and act consistently in terms of annual increase in area of the community budget.

Launched by Lisbon agenda, European Research Area has set a reference framework for European research. Of the occasion of the Barcelona Council, the European Union has set a very ambitious target: increase to 3% by the year 2010, the share of financing costs in GDP of each member state, 2/3 of the funding is covered by public contribution and the remaining by public sector. At that time (March 2002) the share of research expenditure in GDP was 2, 8% in the U.S. and slightly exceeded the 3% in Japan.

In setting these goals was taken into account the particularities occurring in specific developments in recent years:

- Due to its complexity increases the research is becoming more expensive: in 20 years the cost of launching a drug doubled, and that of introducing a new microelectronic component increased 10 times. And it should be noted that there are enough areas and research projects that cannot be supported effectively by contributing only one member country;
- A European industrial policy in specially in areas with high competitiveness—by example: information and communications technology, biotechnology and nanotechnology, aeronautics and technology of obtaining energy from

hydrogen – requires the integration of the research efforts of the member countries;

- European Union supported work in the field has created „European added value”, which has origin in the combination of efforts on many plans:
 - Establishing a ”critical mass” of inputs especially in key areas of development such as microelectronics, telecommunications, biotechnology, aeronautics;
 - Enhancing excellence by European competition and transnational cooperation: NeuroPrions network, for example, brings together 52 research laboratories of transmissible spongiform encephalopathy;
 - Exercise a catalytic effect on national initiatives and in the plan of coordinate improving of large multinational projects.
- Financing detention will contribute to the achieving „3% objective”, including complementary measures to stimulate the private initiative;
- In this context is looking for the most attractive means to attract European companies to massive scientific research. European economic effectors invest less in research than companies from U.S, Japan and South Korea. However when they took the decision to fund research projects, European entities directs usually the funds outside the old continent.[1] In support of these initiative is also considering:
 - Attracting to cooperation in large projects, universities and large companies in Europe;
 - Increasing human resources involved in research; complementary to “3% objective” is the target of increasing European researchers to 8 per thousand;
 - Strengthening the excellence centers.
- Create as many „European excellence centers”, with a high level of „vision”, wide open to international horizon and become attractive to the best researchers of around the globe, is one of the „hot spots” of Lisbon agenda in this field essential to accentuate the role of Europe on the world stage technology and research initiative with topics of global interest;
- Europe has not yet sufficient capacity to transform science into products and services – especially for commercial purpose – and to make of these an economic „boom”. European companies addressed annually *in corpore* in order to be patented 170 applications per million inhabitants compared with more than 400 applications submitted in the same terms of their North American counterparts. And the trade deficit of the European Union relating to high technology is approximately 23 billion of euro annually;[2]
- Funding research combined through 3 different: *social cohesion policy*– Structural funds and cohesion funds – *Research framework program*– FP7[3] and the *Competitiveness and innovation framework program*;
- The increasing role of universities. Science is a major component of the European life style. It supports sustainable development: improving living standards, quality of life, health and environment depend largely on the achievements of science and their applications to the challenges facing society.

At the same time the „science triangle” – education, research, innovation – works best when the results of which improves the operating conditions of economy and society are rewarded. It is, therefore, an obligation of the generation of today to ensure the conditions for development of scientific research at a level to ensure the competitiveness and continues development on medium and long term.

6 preeminent goals

In seeking to increase the impact of his actions in the field, the European Union has focused its efforts on 6 prevalent coordinates. In the same time the community budget of research will be allocated on the following principles: 1) the balance between current and future studies; 2) an optimal dose between basic research and applied research; 3) a „fine tuning” between resources devoted to human and material capital.

Designed to stimulate both cooperation and competition and to support both projects whose need arises spontaneously and initiatives based on policy options, the 6 goals converge to:

- *Creating European centres of excellence* based on programmes to support transnational collaboration between research centres, universities and companies have an observable impact on the dissemination of knowledge and results within the Union;
- *Launching European technological initiatives* by which “the integrated programmes” and “technology platforms” will be put at work in a “pan-European” vision. This approach has been, or will be, adopted in areas such as energy (hydrogen technology, photovoltaic solar energy), transport (aeronautics), mobile communications, embedded systems and nanoelectronics. This entails in particular identifying the legal and regulatory conditions needed in order to implement the common research agenda;
- *Stimulating the creativity of basic research* through competition between teams at European level. It is strongly required an increased effort on basic research in Europe given the increasingly recognised impact of this type of research on economic performance, as stressed by industry. Projects would be proposed by researchers on their own initiative, without thematic constraints, on subjects of their choice. Projects would then be selected, without any obligation for transnational collaboration, on the basis of their scientific excellence, as assessed by peer review ;
- *Making Europe more attractive to the best researchers.* Promoting the development of European scientific careers, at the same time helping to make sure that researchers stay in Europe and attracting the best researchers to Europe are the main targets of “Marie Curie” actions which are being conducted for these purposes by placing emphasis on:
 - attracting young people to science and the initial training of researchers through support for the structuring of training, in particular transdisciplinary training;

- the role and place of women in science and research;
 - the transfer of knowledge, for the benefit in particular of the technologically least advanced regions and SMEs;
 - life-long learning and career development.
- *Developing research infrastructures of European interest.* With the creation of the ESFRI Forum [4], an important step has been taken in the field of research infrastructures in Europe. Until then, EU activities had been mainly confined to support for transnational access to infrastructures and for research projects helping to raise their performance. It is proposed to strengthen this action through the introduction of support for the construction and operation of new infrastructures of European interest in the form of a mechanism like that used for the trans-European networks based on the model used to support a free electron laser and nanoelectronics facilities in the framework of the “European Growth Initiative”.
- *Improving the coordination of national research programmes.* This involves increasing the resources allocated to the ERANET activities for the networking of national programmes, extending the financial support they offer to research activities, and an increased effort towards mutual opening-up. The aim of the Union's participation in national programmes carried out jointly under Article 169 of the Treaty²⁰ is to ensure their genuine integration. The example of the clinical trials platform for poverty-related diseases, while it has a number of special features, nevertheless enables a certain number of lessons to be drawn. The implementation of activities based on Article 169 would appear to be easiest in areas where the Member States are starting to introduce programmes. But it is in the fields where established national structures exist that this provides most benefit. It would seem to be appropriate to use this formula:
- in areas in which the Member States have firmly displayed their willingness to commit themselves financially;
 - as an instrument to support “variable-geometry” cooperation between a limited group of Member States;
 - with the most effective decision-making mechanisms: “packages” of actions to be agreed upon at the same time by the Council and the European Parliament; or a “framework regulation”.

Taking full advantage of complementarity with the Structural Funds

To achieve the Lisbon agenda, all research institutions of the enlarged Union must be given the means to take the road to excellence. The opportunity to take part in projects of limited size in small partnerships with excellent laboratories in other countries will enable young teams and less powerful institutions to benefit from transnational cooperation, whilst acquiring the experience necessary to become involved in complex

projects. The transfers associated with the projects will help to strengthen the knowledge base of all European Union countries.

In the spirit of the action carried out in recent years to support centres of excellence in the then candidate countries, consideration should be given to the possibility of strengthening excellence and making it more visible where further development is needed by means of specific initiatives in the regions concerned, covering measures relating to human resources, exchanges and networking, the development of equipment and evaluation.

Part of the Structural Funds is allocated to supporting the development of research capability: local research infrastructure, human resources, the creation of intermediary bodies between universities and SMEs. The proposal for reform of cohesion policy makes the “Lisbon agenda” one of the main bases for Structural Fund intervention in the “Convergence” Objective regions, and a basis which must be covered by the programmes in the “Regional competitiveness and employment” Objective regions.

In order to take full advantage of this trend, it is necessary to:

- Strengthen complementarity between the use of the Union’s research budget and the Structural Funds, in particular in the framework of the future “Strategic Union guidelines for cohesion”;
- Increase their combined use, for example by granting complementary funding from the Structural Funds where a research project co-financed by the Framework Programme is carried out in a “Convergence” Objective region.

Seventh Framework Programme is just too important to ignore.

EU has been launching calls for proposals for FP7 in 42 areas today, representing about €4 billion. It is looking for projects to be suggested in all sorts of areas – developing the research potential of Europe's poorer regions, supporting researchers who want to work in another country, research to help small companies. We are also looking for projects in specific thematic areas. This could be something like combating stroke, from the Health theme, tools for controlling infectious animal diseases, from our food, agriculture, fisheries and biotechnology theme, or low resource consumption buildings, from our environment theme. But EC doesn't have specific ideas – it indicates the theme and then it is up to the research community to form partnerships and come up with really good ideas in that specific area.

This call for proposals also sees the beginning of the European Research Council. This is a new element in FP7 and gives Europe, for the first time, a body dedicated to supporting the best research out there that pushes forward the frontiers of our knowledge. The ERC's Scientific Council – the men and women from the scientific community that are steering the ERC – have decided that the first year should be dedicated to starting investigators, that is, researchers at the beginning of their career. I'm really excited about the ERC, and how it can help Europe build its knowledge base.

Each call for proposals will indicate a deadline by which we need to receive the proposals. Once that deadline has passed, all the proposals are examined by independent evaluators. These are scientists from across Europe and also outside, who are able to evaluate how the projects correspond to our three main criteria: the quality of the science (obviously the most important), the intended impact of the project and the means of

implementing it. On the basis of this independent evaluation, the best projects are identified and then the Commission and the project team agree a contract, and the funding starts.

The new programme will build on past successes in realising an European Research Area, adding space and security to the current research fields.

As the driver for the production and exploitation of knowledge, research is above all a linchpin in the implementation of the Lisbon strategy to make Europe the most dynamic and competitive, knowledge-based economy in the world, capable of sustaining economic growth, employment and social cohesion.

Investing in knowledge is the best way for Europe to foster sustainable growth in a globalised economy... yet, the EU invests considerably less in Research & Development than its trading partners

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1. For example, European pharmaceutical companies, tend to focus their research efforts in the U.S, especially around the universities from the east coast.
2. European Commission, Statistics of science and technology in Europe, 2008 edition.
3. In spite of this new approach, there are many elements of continuity: in practice, for the majority of participants, the programme itself will not change, but participation will become simpler.
4. ESFRI: European Strategy Forum on Research Infrastructure.

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